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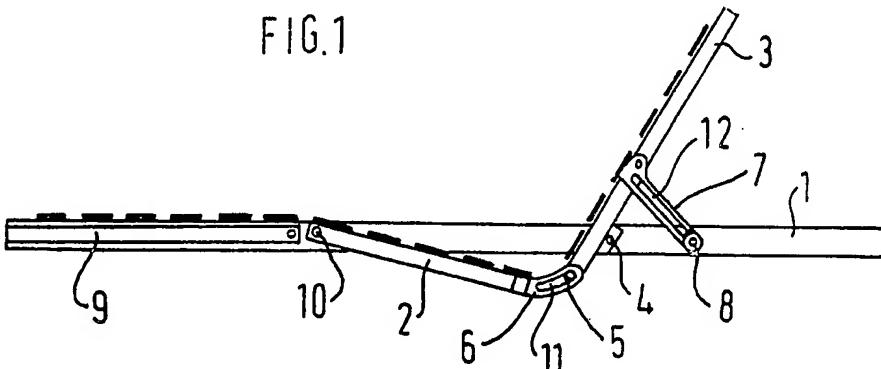
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## (54) Adjustable furniture for lying upon

(57) An adjustable recliner comprises a main frame (1) and a reclining surface, the reclining surface further comprising a head portion (3), a centre portion (2) and a foot portion (9). Head portion (3) is pivoted to the frame (at 4) and is locked by a brake (7, 8, 12). In a preferred embodiment the head portion and centre portion

are connected to each other by a movable i.e., sliding pivot and the centre portion and foot portion are connected to each other by a fixed i.e., non-sliding pivot (10). The movable (sliding) pivot comprises a member (6) defining a curved slot (11), the member (6) being attached to and projecting from the centre portion (2) and the curved slot (11) being engaged by a pin (5) provided on the head portion (3). The curvature of the member (6) is such that the member extends in a plane which is different from the plane of the centre portion (2) and such that relative adjustment of the head and centre portions is achieved by the action of the body weight of the user.

FIG.1



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FIG.1

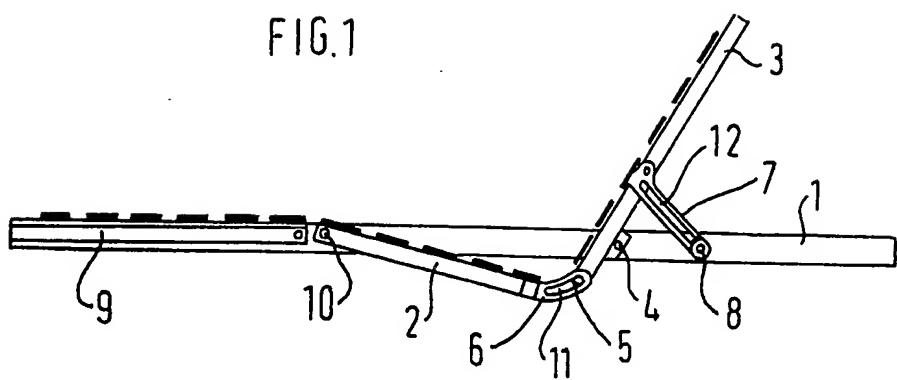
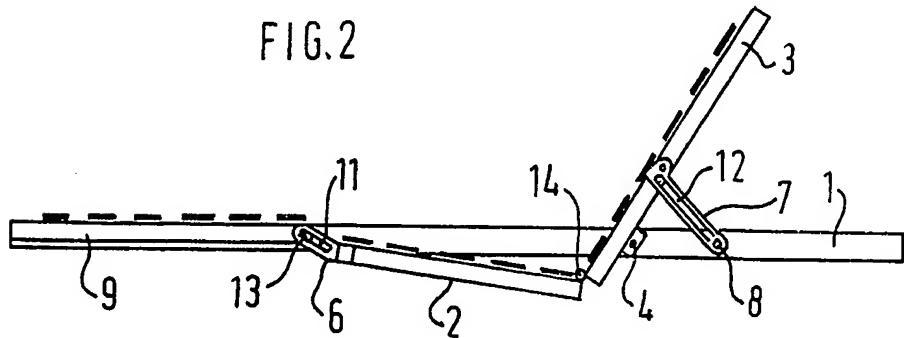


FIG.2



**SPECIFICATION**  
**Adjustable furniture for lying upon**

- The invention relates to adjustable furniture for lying upon and in particular to an adjustable recliner including a main frame and a reclining surface, the reclining surface comprising at least a main portion and a head portion and being mounted in the main frame so that it can tilt about a horizontal axis and can be fixed in different positions. The main and head portions are hinged together so that their relative position is adjustable by the action of the body-weight of the user.
- A recliner of this type is described in German Auslegeschrift No 28 49 304. In this known recliner, a central portion is supported on longitudinal elements which are connected to corresponding elements on the head portion by means of pin and slot assemblies. When the relative positions of the head and the centre portions are adjusted, the pins slide within the slots, which are rectilinear. In order to achieve a situation where, in terms of adjustability, the head portions reacts more easily to weight displacement and the adjustability of the recliner remains substantially independent of the weight of the user, the head portion is designed to rotate about a swivel axis by means of a torsion spring supported on the stationary main frame. A separate, tensile brake member is provided in order to lock the head portion and centre portion in positions relative to each other.
- This known recliner has various disadvantages. The effect of the torsion spring greatly decreases with increasing adjustment and can, with extreme adjustment, decrease almost to zero. Moreover, a serious risk of injury is created by the torsion spring, which is pre-stressed when the bed is extended. When there is no load, (in particular when there is no mattress) it can easily happen that the brake on the head portion is accidentally released, as a result of which the head section is suddenly raised by the pre-stressed spring, so that anyone dealing with the bed may be seriously injured. Consequently, the torsion spring must be as large as possible if it is to have a useful effect over the entire adjustment range. At the same time, however, large dimension of this spring considerably increases the imminent risk of injury in the instance described hereinabove.
- The aim of the present invention is to provide a recliner of the type described hereinabove so that ease of adjustability is guaranteed, but that no risks of injury exist through parts jerking up as the result of locking elements being accidentally released or unlocked.
- This aim is achieved by providing one end of the main portion with a fixed pivot mounting and the other end with a movable pivot mounting which includes a guide extending in a plane which different from the plane of the main portion.
- Accordingly, the present invention provides an adjustable recliner including a main frame and a reclining surface, the reclining surface comprising

- 65 at least a main portion and a head portion and being adapted to pivot in the main frame about a horizontal axis and to be fixed in different positions relative thereto, the main portion and head portion being pivotally interconnected, in 70 which one end of the main portion is provided with a fixed pivot mounting and the other end is provided with a movable pivot mounting which includes a guide, the guide extending in a plane which is different from the plane of the main portion.
- 75 According to the present invention, it is possible, in a surprisingly simple manner, to avoid the use of springs which generate dangerous pre-stressed forces and to adjust the 80 head portion merely by the action of the weight displacement of the user. By virtue of the configuration of the guides in accordance with the present invention, the torques acting on the pivot of the head portion and generated by the weight 85 of the user are very much lower than those generated in systems envisaged by the prior art. The guide may comprise at least one curved slot and a bolt movable therein. The most suitable shape for the slot can be selected according to 90 the dimensions of the portions of the reclining surface and the desired degree of adjustability. Irrespective of where the guide is placed in relation to the reclining surface it is essential for the bolt to move in the direction of an increasingly 95 smaller radius of the guide when the transition is made from a recumbent position to a sitting position. In other words, in the sitting position, the bolt is always located in that part of the slot having the smallest radius of curvature.
- 100 According to a preferred embodiment of the present invention, the slot is curved upwards in relation to the plane of the main portion. Thus the radius of curvature of the slot becomes increasingly smaller in an upward direction. In an 105 alternative embodiment, the highest point of the slot (corresponding to the most upright sitting position) is located at a clear distance above the plane of the main portion and the lowest point of the slot lies substantially in the plane of the centre portion.
- 110 In a third embodiment of the present invention the member carrying the slot is fitted in such a way that the highest point of this fitting is below, or at most level, with the reclining surface in the 115 recumbent position. For example, this can be achieved by designing the corresponding parts of the fitting as elements bent downwards at right angles. The function of the recliner is not changed by this, but it is ensured that in the recumbent 120 position, there are no parts of the fitting above the reclining surface. Thus, denting of a mattress, or the need for special covering elements, is avoided. The main portion and/or the head portion can be provided with extensions to accommodate 125 pivot pins and/or slots and/or bolts.
- Preferably, at least one brake member is provided between the head portion and the main frame. The brake member may be pivoted to the head portion and provided with a slot extending

- substantially over its entire length to engage a brake pin, attached to the main frame. By tightening or loosening clamping elements provided for the brake pin, it is possible to fix the 5 relative positions of the head portion and the main portion as required.
- In a preferred embodiment of the present invention the end of the main portion remote from the head portion is provided with a fixed pivot and 10 the end adjacent the head portion is provided with slots which are curved upwardly in relation to the plane of the main portion. An advantage of this embodiment is that when the head portion is restored to the recumbent position, the point of 15 application of the force which, by virtue of the curved slotted guide, is relatively near the pivot pin of the head portion, brings about a particularly favourable transmission of the forces applied to the head portion in the sense of a return 20 movement of the head portion. The displacement of the point of application of the force between head portion and main portion relative to the pivot pin thereby achieved brings about the desired easy adjustability of the bed in both directions.
- 25 Preferably, the bolts engaging the upwardly curving slots are located near the ends of the head portion or near the ends of extension provided on the head portion.
- In another embodiment of the present 30 invention, the main portion is connected to the head portion by means of a simple hinge and the end of the main portion (or an extension thereof) remote from the head portion is provided with slots which curve upwardly in relation to the 35 plane of the main portion. The curved slots engage bolts connected to the main frame. A further foot portion is provided and the pivot pin securing the foot portion to the main portion can serve as a bolt to engage the guide. Also in the 40 case of this particularly simple and compact embodiment, adjustment of the bed into the sitting position is merely assisted by the weight displacement of the user.
- The present invention will be illustrated, merely 45 by way of example, in the following description and with reference to the accompanying drawings, in which like numerals denote like parts. In the drawings:
- 50 Figures 1 and 2 show schematically two preferred embodiments of the present invention in side view.
- Referring to Figure 1, a centre portion 2 and a 55 head portion 3 are mounted in a main frame 1 and pivot about transverse pins 10 and 4 respectively. A foot portion 9 is attached to the end of centre portion 2 remote from the head portion and the said foot portion can either be fixed to the frame or arranged so as to pivot independently of the centre portion and the head portion.
- 60 Centre portion 2 and head portion 3 are pivotally connected by means of guides 6 (only one shown) provided on the side of the centre portion and extending in the direction of head portion 3. (Bolts 5 (only one shown) engage slots 65 11 of the guide 6 and are located on extensions of head portion 3. The slots are curved upwardly in relation to the plane of centre portion 2 in such a way that the lowest point of slot 11 constitutes an end point of the guide and lies substantially in the plane of the centre portion. The highest point of the curve slot again constitutes an end point of the guide and is a definite vertical distance above the plane of the centre portion.
- 70 Preferably, slot 11 is curved upwardly with a decreasing radius of curvature. The curvature of this slot can be selected to correspond to the required kinematics.
- In order to secure head portion 3 in any 75 position, a brake member is located between main frame 1 and head portion 3 and comprises brake strap 7 which is pivotally attached to the head portion 3 and which is provided with a slot 12 extending substantially over its entire length. The 80 slot 12 engages a brake pin 8 attached to the main frame. Head portion 3 can be fixed in any position by tightening or loosening clamping elements (not shown) provided on brake pin 8. Any other suitable brake device can also be used.
- 85 90 In the embodiment illustrated in Figure 2, centre portion 2 and head portion 3 are interconnected by means of a simple hinge 14. At the other end of centre portion 2, guide straps 6 (one shown) are provided in which slots 11, 95 which extend upwardly in relation to the plane of the centre portion, are provided. Pivot pin 13, acting for foot portion 9 engages these slots.
- 100 Within the scope of the present invention, the special design of the connection between the centre portion and the head portion or foot section permits adjustment of the relative positions of centre portion and head portion without recourse to torsion springs. Thus, 105 adjustment can be safely undertaken even if no mattress or other covering is present on the recliner. This functional advantage is associated with simplicity of design which leads to considerable savings in costs. This is also of importance, for example, if the adjustable recliner 110 is based upon one or more slatted members.
- Claims**
1. An adjustable recliner including a main frame and a reclining surface, the reclining surface comprising at least a main portion and a 115 head portion and being adapted to pivot in the main frame about a horizontal axis and be fixed in different positions relative thereto, the main portion and the head portion being pivotally interconnected, in which one end of the main portion is provided with a fixed pivot mounting and the other end is provided with a movable pivot mounting which includes a guide, the guide extending in a plane which is different from the plane of the main portion.
- 120 125 2. A recliner according to Claim 1, in which the guide comprises at least one curved slot and a bolt which engages said slot.
3. A recliner according to Claim 2, in which the

- guide has a curve with a decreasing radius of curvature.
4. A recliner according to any one of the preceding claims, in which the main portion and/or the head portion are provided with extensions to accommodate the guides.
5. A recliner according to any one of Claims 1 to 3, in which the slots are provided in fittings attached to the main portion or the head portion.
- 10 6 A recliner according to any one of the preceding claims, in which the end of the main portion remote from the head portion is provided with a fixed pivot and the end or any extension thereof adjacent the head portion is provided with slots which curve upwardly in relation to the plane of the main portion.
- 15 7. A recliner according to Claim 6, in which the bolts which engage in the upwardly curving slots are located near the end of the head portion or any extension thereof.
- 20 8. A recliner according to any one of Claims 1 to 5, in which the main portion is connected to the head portion by means of a fixed pivot and the end of the main portion or any extension thereof remote from the head portion is provided with slots which curve upwardly in relation to the plane of the main portion.
- 25 9. A recliner according to Claim 8, in which the curved slots engage bolts attached to the main
- 30 10. A recliner according to any one of the preceding claims, in which the main portion is divided into a centre portion and a foot portion.
11. A recliner according to Claim 10, in which the pivot pin acting for the foot portion also serves as a bolt to engage the slot.
- 35 12. A recliner according to any one of the preceding claims, in which a brake member is provided between the main frame and the head portion of the main portion.
- 40 13. A recliner according to Claim 12, in which the brake member comprises at least one brake strap located between the mounted head portion and the main frame.
- 45 14. A recliner according to Claim 13, in which the brake strap is pivotally mounted on the head portion and is provided with a slot extending substantially over its entire length, the slot engaging a brake pin attached to the main frame.
- 50 15. An adjustable recliner, substantially as hereinbefore described, with reference to and as illustrated in Figure 1 of the accompanying drawings.
- 55 16. An adjustable recliner, substantially as hereinbefore, described, with reference to and as illustrated in Figure 2 of the accompanying drawings.